



Platform Proto-Federation Experiment Plan

AMG 12

12-13 June, 1996



Platform Proto-Federation

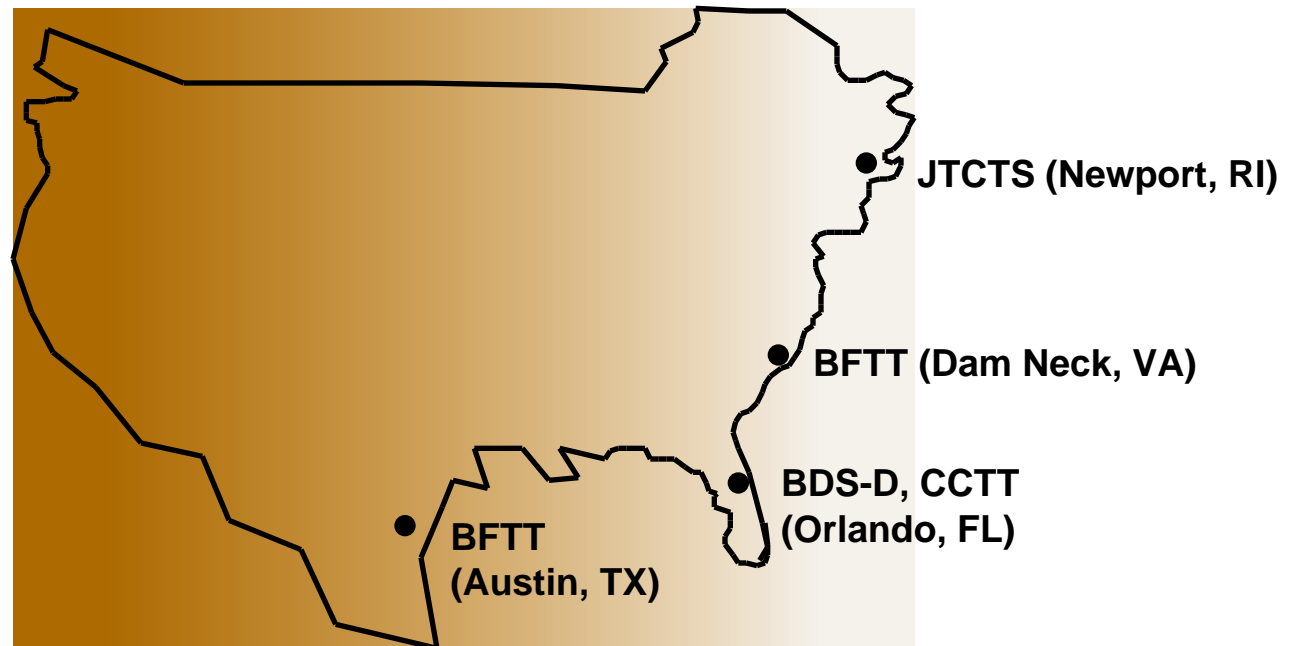
- BDS-D: M1 manned simulator
- BFTT: embedded simulators for carrier, destroyer, gunboat, and weapons
- CCTT: computer generated ground forces
- JTCTS: engineering models for live aircraft and weapons



Participants and Location of Sites

System	Technical POC	Government POC
BDS-D M1 Simulator	Mikel Petty/IST	KarenWilliams/ STRICOM
BFTT System	Dale VonHeeder/ ARL:UT	Allen Stennett/ NSWC PHD ECO
CCTT SAF	Peter Berggren/SAIC	John Foster/ STRICOM
JTCTS Virtual Prototype	Paul Rattey/Raytheon	Al Gramp/NAWC
Common Software	Stephen Bachinsky/TASC	Susan Harkrider/ STRICOM

HLA Evaluation
Experiment
Sites





Experiment Plan Report

- Details HLA Test Objectives for the PPF
 - assess developmental impact of HLA on simulation programs
 - determine ability of Common Software to facilitate federate integration with RTI
 - examine ability of HLA to support platform-level simulations
- Defines Experiment Phases with Activities Keyed to Test Objectives
 - Federation Functional Performance (RTI support for initialization, synchronization, ownership, and data exchange)
 - Federation Execution Performance (stress, ownership transfer, fast movers performance)



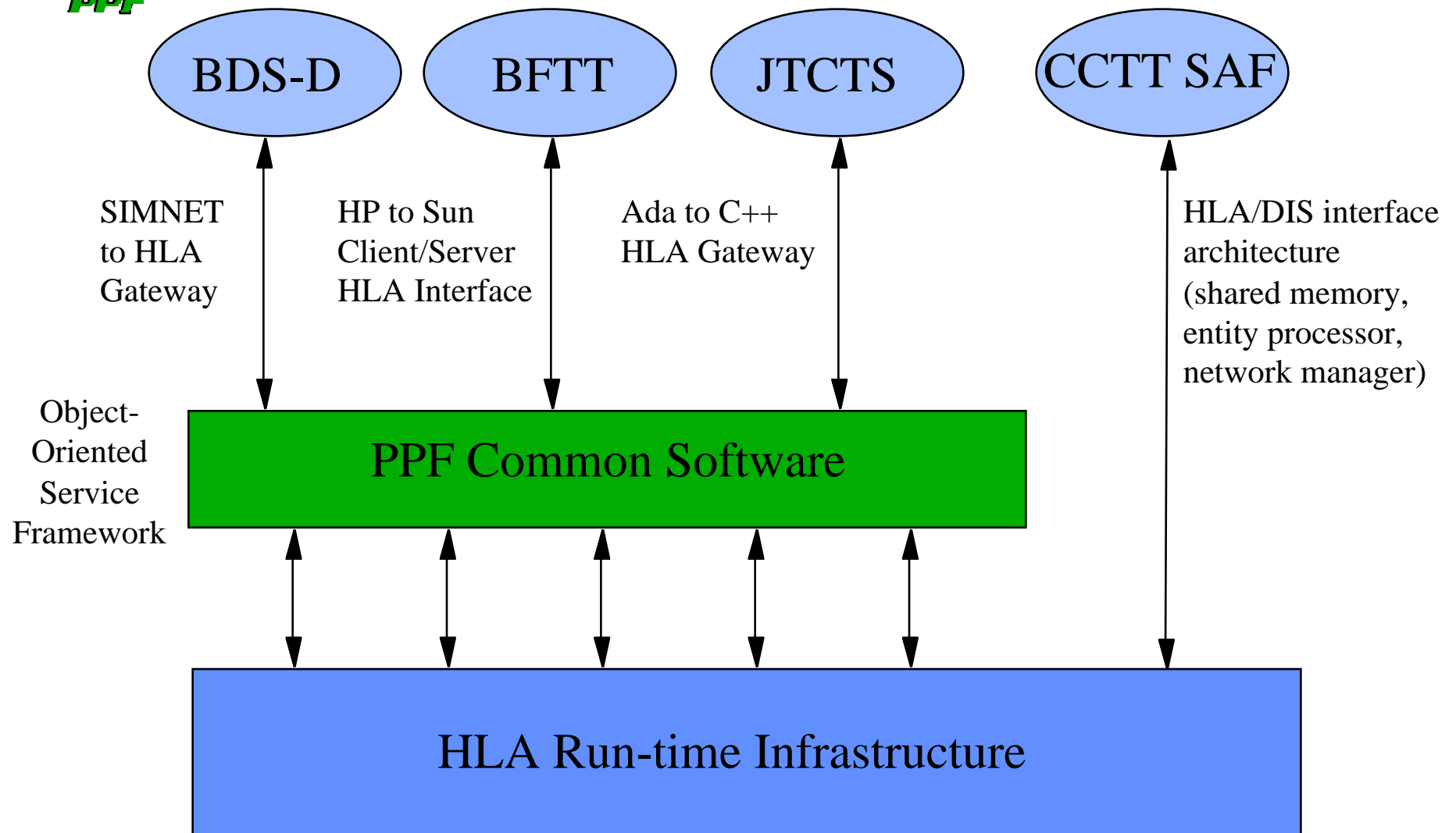
HLA Impact

Metrics and Evaluation Process

- Conversion of DIS/SIMNET simulations to HLA
 - adaptation requirements (mapping of entity state/events to class/attribute and interaction paradigm)
 - time/cost
 - adequacy of RTI services
- Evaluation Process
 - self-federate testing
 - implementation conformance
 - connectivity testing
 - interoperability conformance



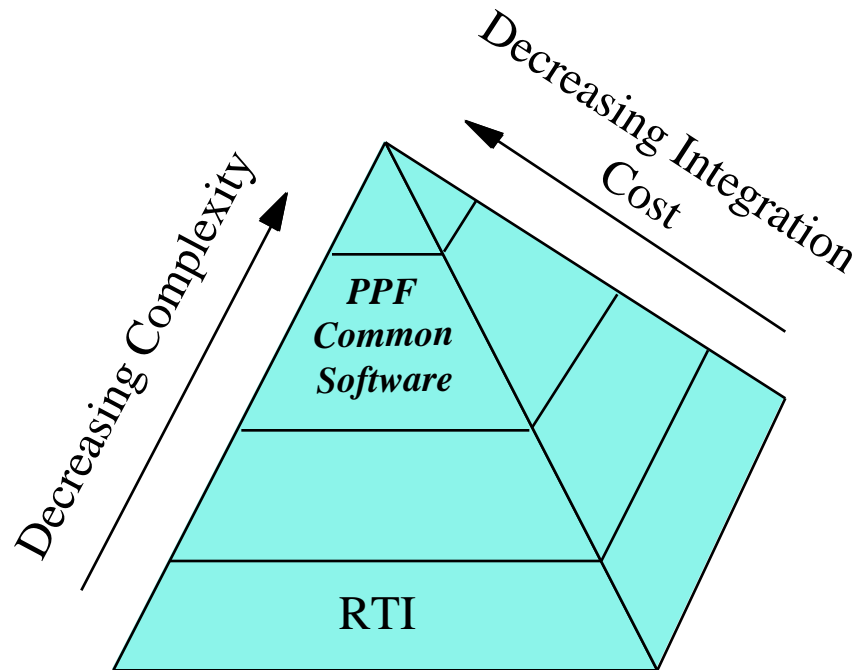
RTI Integration





Benefits of PPF Common Software to the HLA

- Manage Complexity
 - RTI/HLA implementation issues solved in a central location
- Minimize Integration Time
 - Interface can be tailored to specific needs of the platform simulation
 - Results in lower development costs
- Maximize Extensibility
 - *Service Repository*: allows users to Plug and Play alternative implementations
 - *Object-Oriented Methodology* allows reusability of services by inheritance -- powerful new services can be created leveraging off of already existing services





Phased Experiment Approach

- Experiments based on engagements involving two or more federates
 - controlled experimental process (test two at a time, adding new Federates as experience and knowledge grows)
 - focuses HLA evaluation on unique interoperability issues associated with the different DIS/SIMNET simulations
- Sequence supports separate focus on key Federation Functional and Execution Performance metrics
 - exercise control, RTI functionality, time management
 - fast movers, stress, ownership transfer



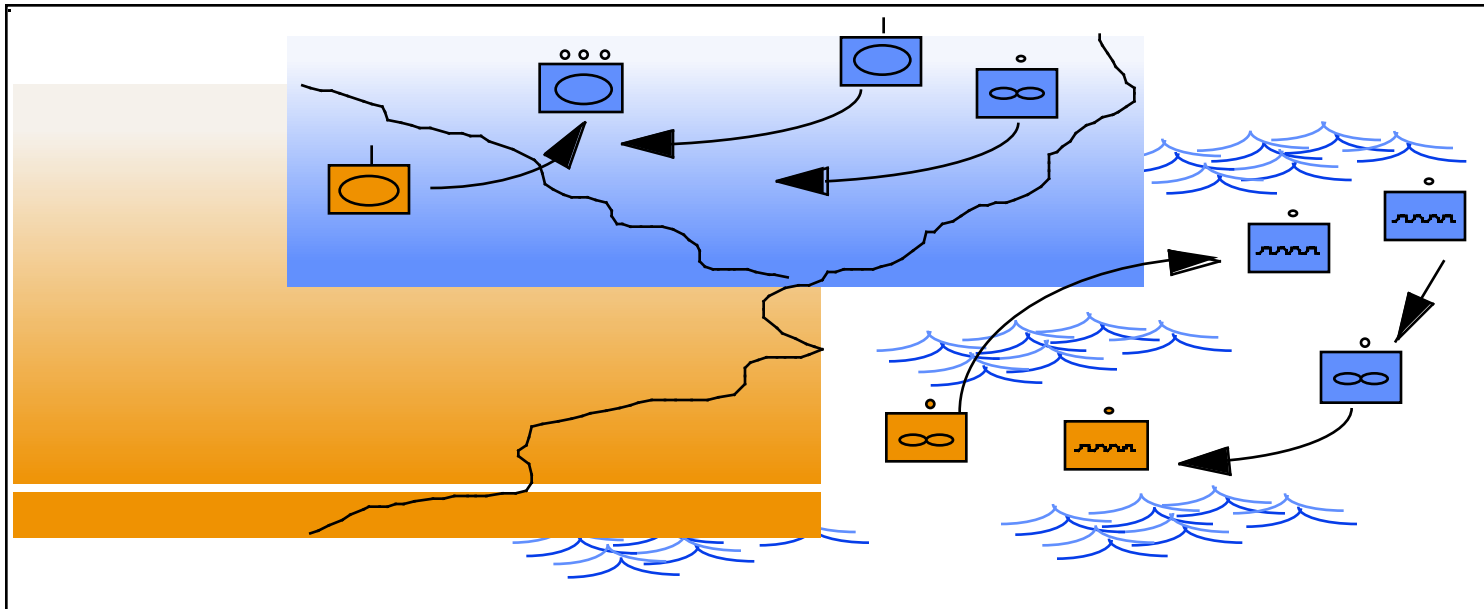
Federation Execution Performance

Performance Issue	Performance Criteria
A. Bandwidth	A.1 Total bandwidth
B. Processing Requirements	B.1 Average CPU utilization B.2 Average CPU utilization for simulation tasks B.3 Average CPU utilization for RTI tasks
C. Memory Requirements	C.1 Average Memory Consumption C.2 Average Memory used for RTI tasks
D. Communications	D.1 Attribute update latencies (RTI, Orbix, network) D.2 Interaction latencies D.3 Instantiate object latencies



Experiment Phases

- Phase I: Orange Company engages Blue Platoon
- Phase II: Blue airstrike of Orange position
- Phase III: Blue ground and air counter-Attack
- Phase IV: Orange air vehicle attacks Blue guided missile cruiser
- Phase V: Blue air vehicle attacks Orange gunboat
- Phase VI: Complete Operation





Experiment Procedures Applicable to Each Phase

- Pre-experiment procedures
 - Coordination (exchange configuration information according to defined protocol)
 - Collect and document initial configuration (computer systems, networks, test tools)
 - Self-federate testing according to defined procedures
 - Connectivity tests -- apply standard test operations: federation instantiation, object instantiation, attribute update)



Experiment Procedures Applicable to Each Phase (continued)

- Execution data collection procedures
 - attribute and interaction monitoring
 - RTI service class functionality
 - execution performance monitoring
 - real-time synchronization behavior
- Quick look analyses to assess whether evaluation metrics are being met
- Post-execution procedures
 - configuration management of PPF datasets
 - analysis to compute metrics and synthesize results



Test Highlights by Phases

- | | |
|---|--|
| <ul style="list-style-type: none">• Phase I: Border Crossing<ul style="list-style-type: none">– CCTT simulates Orange Company Commander, Tank and Motorized Rifle Platoons, Anti-aircraft Squad, and Blue M1 tanks– BDS-D simulates Blue Platoon Member, M1 | <ul style="list-style-type: none">• Tests interoperability of BDS-D (real-time virtual simulation) and CCTT SAF |
| <ul style="list-style-type: none">• Phase II: Blue Ground Airstrike<ul style="list-style-type: none">– CCTT simulates Blue forces as in Phase I plus dismounted infantry; JTCTS simulates F/A-18 aircraft | <ul style="list-style-type: none">• Tests interoperability of JTCTS (“live” training system) and CCTT• Fast movers test<ul style="list-style-type: none">– F/A-18 fires laser guided bomb at tanks– Dismounted infantry fire SA-16 at aircraft |



Test Highlights by Phases (cont.)

- | | |
|--|---|
| <ul style="list-style-type: none">• Phase III: Blue Counter-Attack<ul style="list-style-type: none">– Combines assets from Phase I and Phase II with additional CCTT forces and complex interactions | <ul style="list-style-type: none">• Tests interoperability of BDS-D, JTCTS and CCTT• Stress test |
| <ul style="list-style-type: none">• Phases IV and V: Sea Strike<ul style="list-style-type: none">– Phase IV (Orange sea strike) with F1 engaging a guided missile cruiser (CG47)– Phase V (Blue sea strike) with F/A-18 launched from aircraft carrier to engage gunboat | <ul style="list-style-type: none">• Tests interoperability of JTCTS and BFTT• Test weapon ownership transfer |



Experiment Schedule

